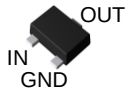
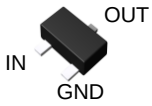
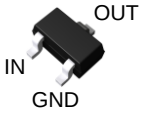
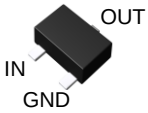
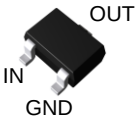
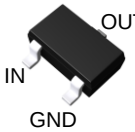
DTC143E series

NPN 100mA 50V Digital Transistors (Bias Resistor Built-in Transistors) Datasheet

Parameter	Value
V_{CC}	50V
$I_{C(MAX.)}$	100mA
R_1	4.7kΩ
R_2	4.7kΩ

●Outline

VMT3  DTC143EM (SC-105AA)	EMT3F  DTC143EEB (SC-89)
EMT3  DTC143EE SOT-416 (SC-75A)	UMT3F  DTC143EUB (SC-85)
UMT3  DTC143EUA SOT-323 (SC-70)	SMT3  DTC143EKA SOT-346 (SC-59)

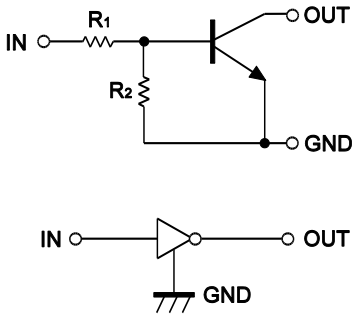
●Features

1) Built-In Biasing Resistors, $R_1 = R_2 = 4.7k\Omega$.
2) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see inner circuit).
3) The bias resistors consist of thin-film resistors with complete isolation to allow negative biasing of the input. They also have the advantage of completely eliminating parasitic effects.
4) Only the on/off conditions need to be set for operation, making the circuit design easy.
5) Complementary PNP Types :DTA143E series
6) Lead Free/RoHS Compliant.

●Application

Switching circuit, Inverter circuit, Interface circuit, Driver circuit

●Inner circuit



●Packaging specifications

Part No.	Package	Package size (mm)	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit (pcs)	Marking
DTC143EM	VMT3	1212	T2L	180	8	8,000	23
DTC143EEB	EMT3F	1616	TL	180	8	3,000	23
DTC143EE	EMT3	1616	TL	180	8	3,000	23
DTC143EUB	UMT3F	2021	TL	180	8	3,000	23
DTC143EUA	UMT3	2021	T106	180	8	3,000	23
DTC143EKA	SMT3	2928	T146	180	8	3,000	23

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●**Absolute maximum ratings** (Ta = 25°C)

Parameter		Symbol	Values	Unit
Supply voltage		V_{CC}	50	V
Input voltage		V_{IN}	−10 to +30	V
Output current		I_O	100	mA
Collector current		$I_{C(MAX.)}$ *1	100	mA
Power dissipation	DTC143EM DTC143EEB DTC143EE	P_D *2	150	mW
	DTC143EUB DTC143EUA DTC143EKA		200	mW
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	−55 to +150	°C

●**Electrical characteristics**(Ta = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input voltage	$V_{I(off)}$	V_{CC} = 5V, I_O = 100μA	-	-	0.5	V
	$V_{I(on)}$	V_O = 0.3V, I_O = 20mA	3	-	-	
Output voltage	$V_{O(on)}$	I_O / I_I = 10mA / 0.5mA	-	0.1	0.3	V
Input current	I_I	V_I = 5V	-	-	1.8	mA
Output current	$I_{O(off)}$	V_{CC} = 50V, V_I = 0V	-	-	0.5	μA
DC current gain	G_I	V_O = 5V, I_O = 10mA	30	-	-	-
Input resistance	R_1	-	3.29	4.7	6.11	kΩ
Resistance ratio	R_2/R_1	-	0.8	1	1.2	-
Transition frequency	f_T *1	V_{CE} = 10V, I_E = −5mA, f = 100MHz	-	250	-	MHz

*1 Characteristics of built-in transistor

*2 Each terminal mounted on a reference footprint

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●**Electrical characteristic curves**(Ta = 25°C)

Fig.1 Input voltage vs. output current (ON characteristics)

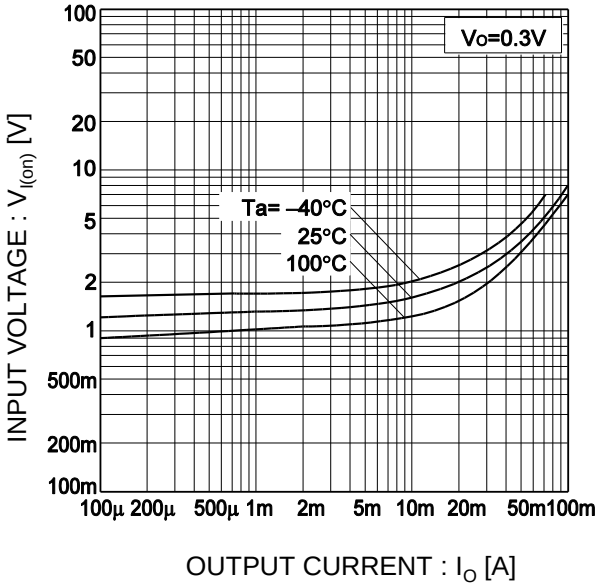


Fig.2 Output current vs. input voltage (OFF characteristics)

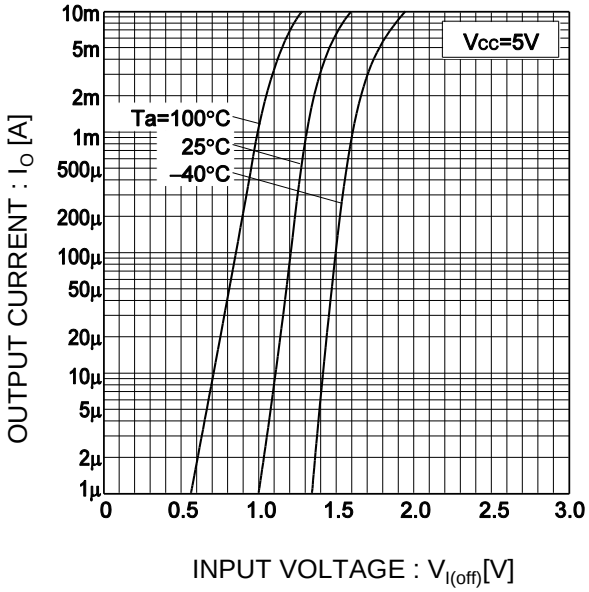


Fig.3 Output current vs. output voltage

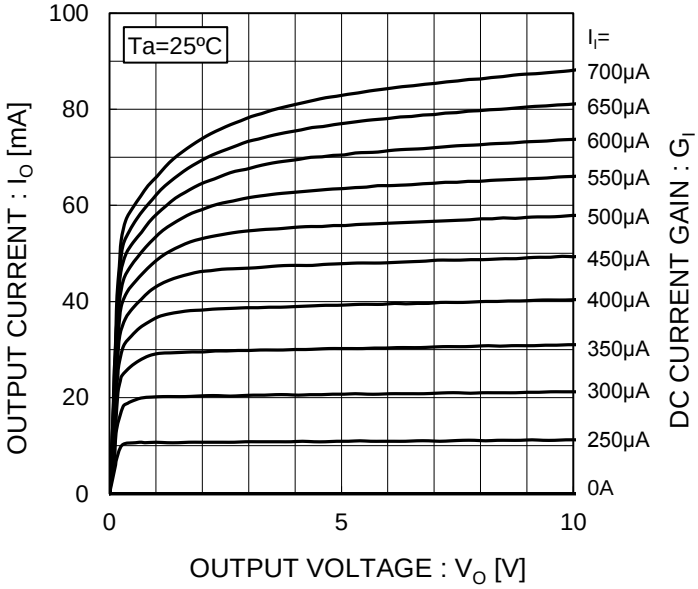
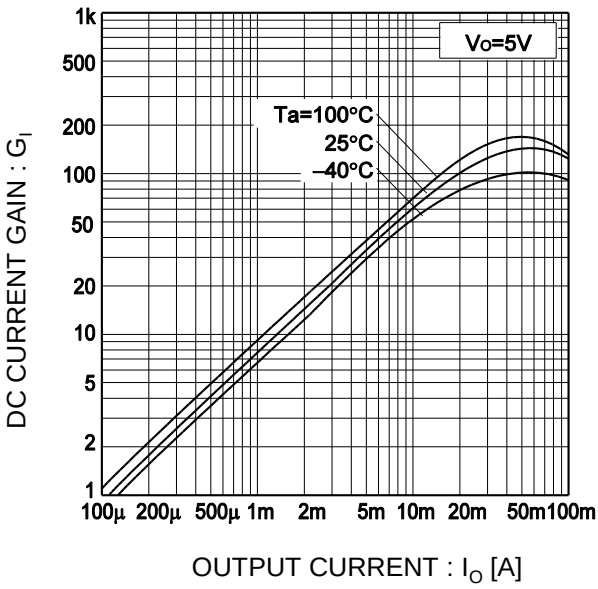


Fig.4 DC current gain vs. output current



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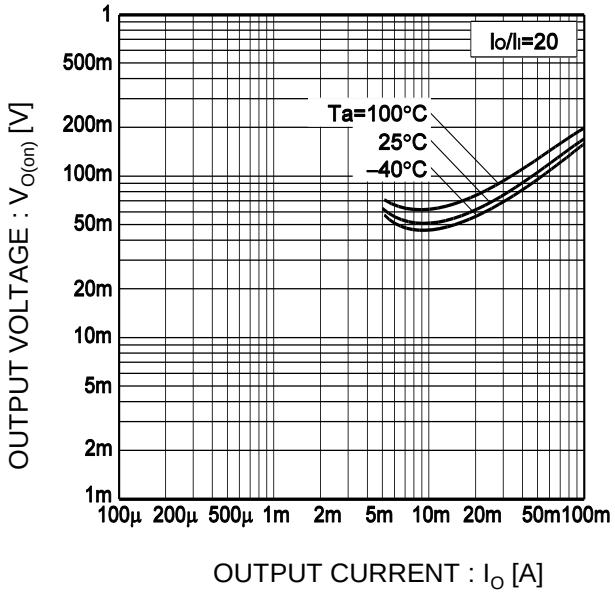
●**Electrical characteristic curves**(Ta = 25°C)

Fig.5 Output voltage vs. output current



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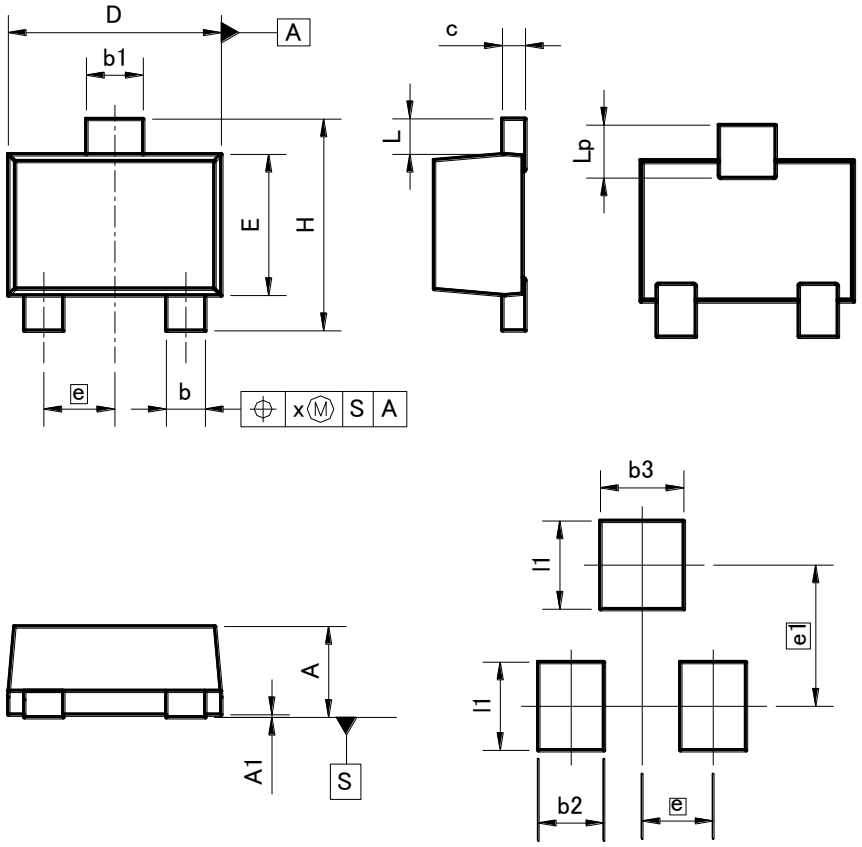
●**Dimensions** (Unit : mm)

VMT3



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.55	0.018	0.022
A1	0.00	0.10	0	0.004
b	0.17	0.27	0.007	0.011
b1	0.27	0.37	0.011	0.015
c	0.08	0.18	0.003	0.007
D	1.10	1.30	0.043	0.051
E	0.70	0.90	0.028	0.035
e	0.40		0.02	
HE	1.10	1.30	0.043	0.051
L	0.10	0.30	0.004	–
Lp	0.20	0.40	0.008	–
x	–	0.10	–	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	0.80		0.03	
b2	–	0.37	–	0.015
b3	–	0.47	–	0.019
l1	–	0.50	–	0.02

Dimension in mm/inches

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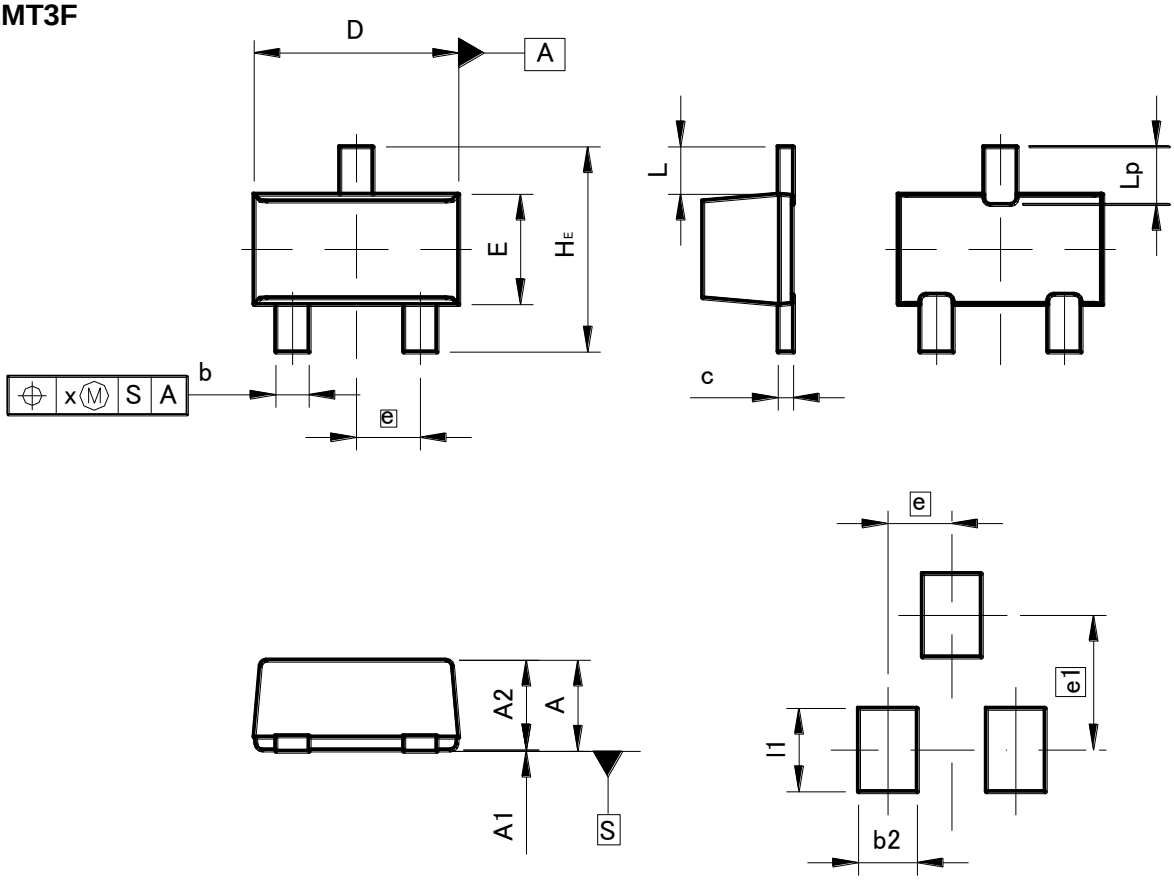
●**Dimensions** (Unit : mm)

EMT3F



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.65	0.85		
A1	0.00	0.10	0	0.004
A2	0.60	0.80	0.024	0.031
b	0.21	0.36	0.008	0.014
c	0.08	0.18	0.003	0.007
D	1.50	1.70	0.059	0.067
E	0.76	0.96	0.03	0.038
e	0.50		0.02	
HE	1.50	1.70	0.059	0.067
L	0.37		0.015	
Lp	0.35	0.55	0.014	0.022
x	−	0.10	−	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	−	1.05	−	0.041
b2	−	0.46	−	0.018
l1	−	0.65	−	0.026

Dimension in mm/inches

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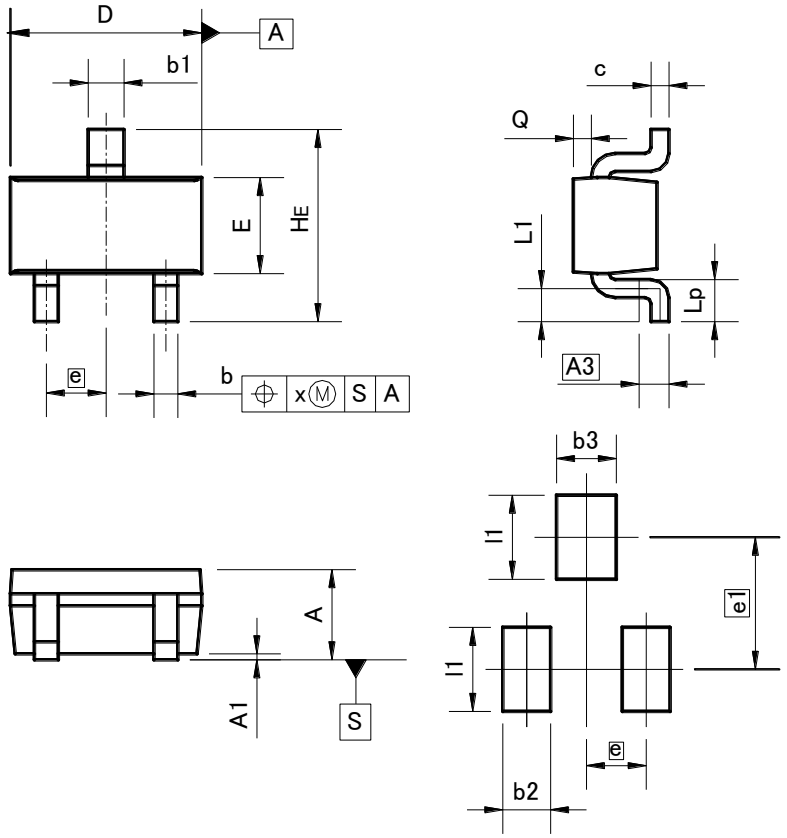
●**Dimensions** (Unit : mm)

EMT3



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.60	0.80	0.024	0.031
A1	0.00	0.10	0	0.004
A3	0.25		0.01	
b	0.15	0.30	0.006	0.012
b1	0.25	0.40	0.01	0.016
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
e	0.50		0.02	
HE	1.40	1.80	0.055	0.071
L1	0.10	–	0.004	–
Lp	0.15	–	0.006	–
Q	0.05	0.25	0.002	0.01
x	–	0.10	–	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	1.10		0.04	
b2	–	0.40	–	0.016
b3	–	0.50	–	0.02
l1	–	0.70	–	0.028

Dimension in mm/inches

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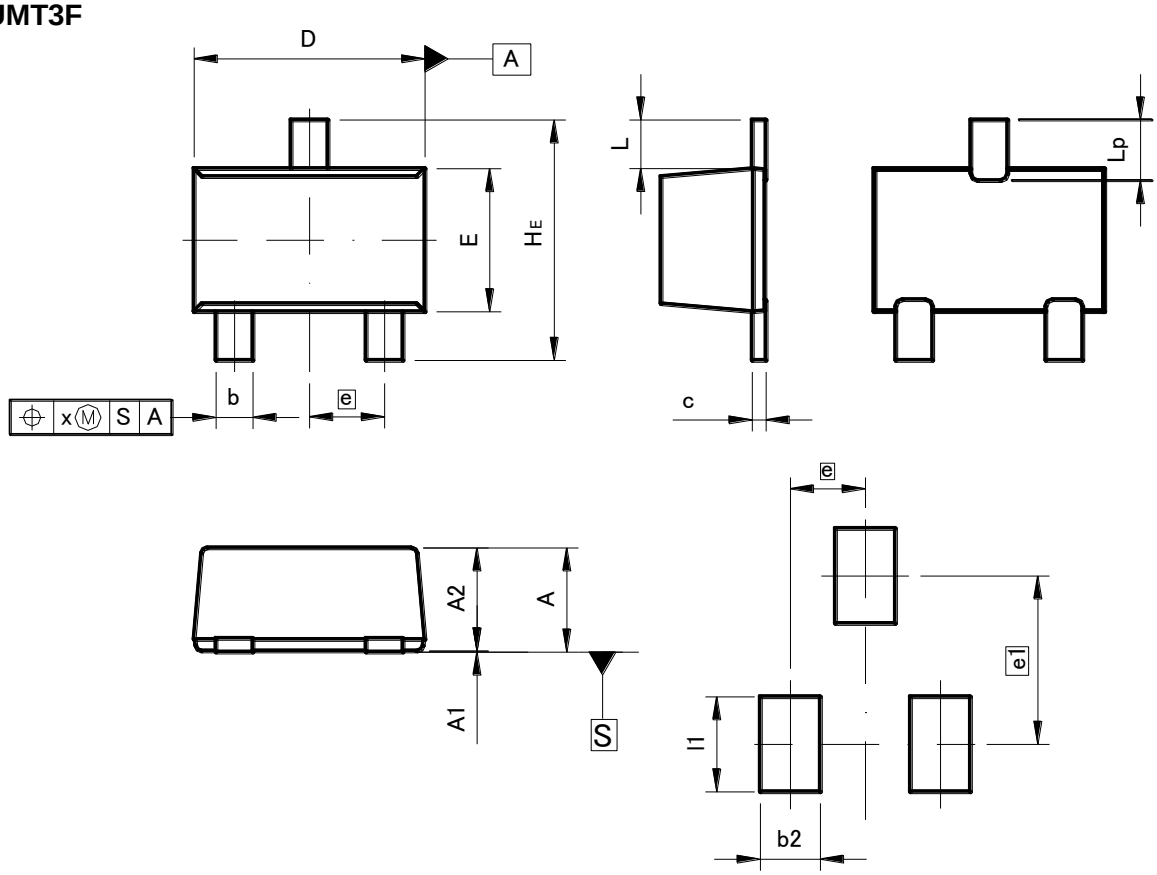
●**Dimensions** (Unit : mm)

UMT3F



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.85	1.05	0.033	0.041
A1	0.00	0.10	0	0.004
A2	0.80	1.00	0.031	0.039
b	0.27	0.42	0.011	0.017
c	0.08	0.18	0.003	0.007
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.03	
HE	2.00	2.20	0.079	0.087
L	0.425		0.02	
Lp	0.43	0.63	0.017	0.025
x	−	0.10	−	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	1.47		0.058	
b2	−	0.52	−	0.02
l1	−	0.83	−	0.033

Dimension in mm/inches

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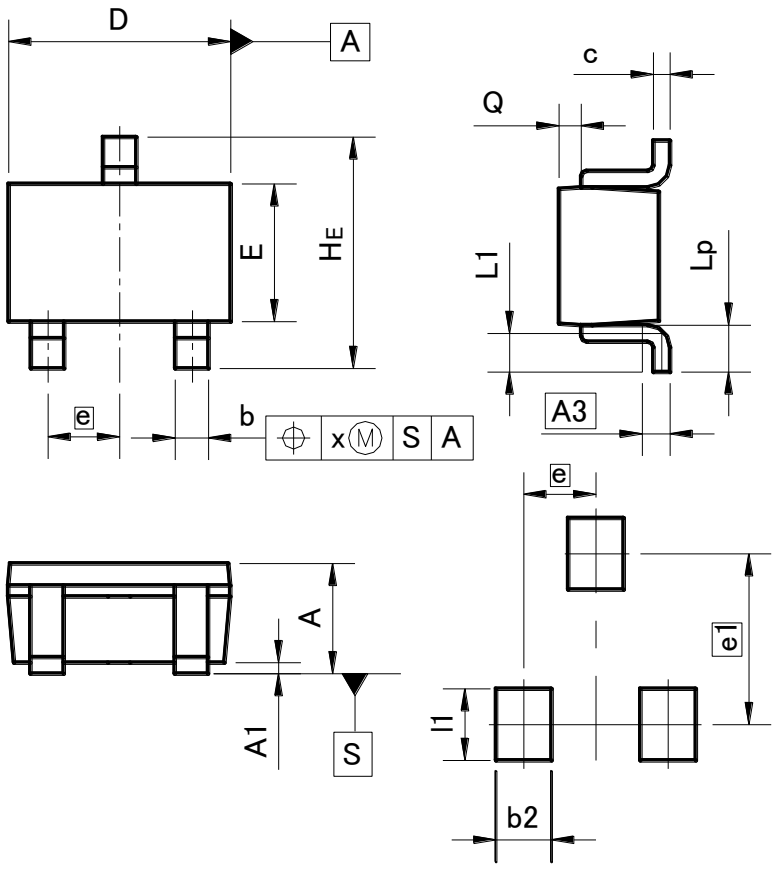
●**Dimensions** (Unit : mm)

UMT3



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0	0.004
A3	0.25		0.01	
b	0.15	0.30	0.006	0.012
c	0.10	0.20	0.004	0.008
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.03	
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.02
Lp	0.25	0.55	0.01	0.022
Q	0.10	0.30	0.004	0.012
x	−	0.10	−	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	1.55		0.06	
b2	−	0.50	−	0.02
l1	−	0.65	−	0.026

Dimension in mm/inches

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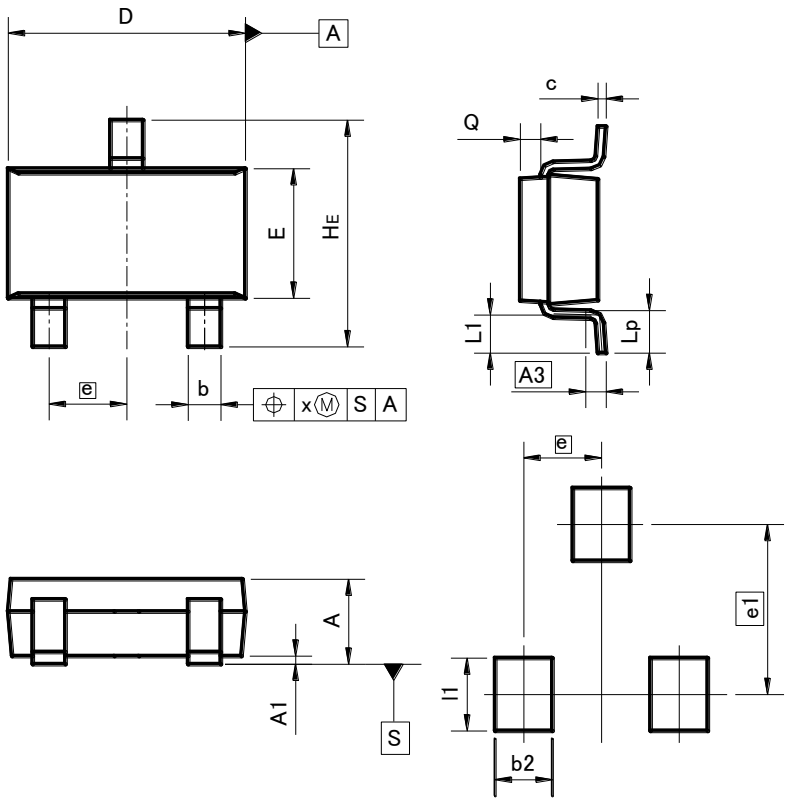
●**Dimensions** (Unit : mm)

SMT3



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.00	1.30	–	0.051
A1	0.00	0.10	0	0.004
A3	0.25		0.01	
b	0.35	0.50	0.014	0.02
c	0.09	0.25	0.004	0.01
D	2.80	3.00	0.11	0.118
E	1.50	1.80	0.059	0.071
e	0.95		0.04	
HE	2.60	3.00	0.102	0.118
L1	0.30	0.60	0.012	0.024
Lp	0.40	0.70	0.016	0.028
Q	0.20	0.30	0.008	0.012
x	–	0.10	–	0.004
y	–	0.10	–	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	2.10		0.08	
b2		0.60	–	0.024
l1	–	0.90	–	0.035

Dimension in mm/inches

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